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The book is designed to be readable even by those without extensive mathematical or scientific training; to give a general view of the results that astronomers have obtained in the course of their investigations; and to reveal something of that spirit which inspires scientific work. Astronomers to-day, perhaps more than ever before are endeavoring to solve great problems. The investigations leading to these ends are diverse, extended and many-sided, and the data drawn from the various sources often admit of widely different interpretations. In some departments advance comes from adhering to the hard and fast facts derived from exact measurements, in others from speculative inquiries based upon data that are more or less insecure, founded upon such observations as have been made to the present time. Often contradictory working hypotheses lie so near the limits of indetermination that one is as plausible as the other, and this is so in many of the problems of great human interest as they stand to-day. Hence it is not always easy to decide between rival hypotheses, for the overbalancing data favorable to one to-day may by fresh accessions to knowledge be turned to-morrow in favor of the other. In producing a work on astronomy for the general reader, and for the student as well, some attempt should be made to give that broadening view that the subject affords, not only by reason of its established facts but from the outlook afforded by investigations now in progress. The latter requires the inclusion of outlines of various theories still in formation, to be accepted or rejected according to the evidence that may be adduced in favor of or against them. In his 'Introduction to Astronomy,' Professor Moulton has many references to unsettled questions. He has always considered them with caution, giving briefly the arguments on both sides of debatable points, without commending to the reader one view rather than the other. The chapter on the evolution of the solar system, which may be regarded as the distinctive one of the book, deserves special mention, since it deals largely with the arguments tending to prove the general insufficiency of the Laplacian

ring nebular hypothesis, which has so long held a place in elementary texts, and to the exposition of the new spiral nebular theory developed by Professors Chamberlain and Moulton. Even in reference to the latter the author cautions the reader against the too hasty acceptance of it as final, for much still remains to be accomplished in the way of quantitative determinations before this theory can take its place among the accepted results of science.

W. J. HUSSEY.

ANN ARBOR, MICHIGAN.

*Introduction to General Inorganic Chemistry.*

By ALEXANDER SMITH. 8vo, pp. xviii + 780. New York, The Century Co. 1906.

This unusually excellent text-book is intended primarily for beginners in college courses. The author has wisely made the elucidation of chemical theory the main feature of the book, but the descriptive part has been well chosen for the purpose in view. Laboratory experiments are used as the basis of treatment, and the theories are thus explained in a very clear and satisfactory way. The subject is treated from the most modern standpoint, but this has been done without giving undue prominence to the newer theories.

An important feature of the book is found in the numerous references to previous pages, which enable the reader to refresh his memory in regard to matters already discussed. Other points attracting attention are a diagram showing the solubility curves of eighteen important salts, a table showing the actual and molar solubilities at 18° of more than a hundred salts, the use of the single or double arrow in place of the usual sign of equality in chemical equations, the introduction of many suggestive exercises or questions for students, and a serviceable index.

The course here presented is undoubtedly a long and difficult one for the average student, who relies mostly upon memory and possesses little or no power of reasoning; for it comprises practically the whole body of modern chemical theory, which is not grasped easily by the chemically vacant mind. However,

Professor Smith's work is certainly a good book for good students, and as such is to be heartily welcomed.

H. L. WELLS.

#### SCIENTIFIC JOURNALS AND ARTICLES.

*The Botanical Gazette* for August contains the following papers: 'The Nascent Forest of the Miscou Beach Plain,' by W. F. Ganong, being the fourth contribution to the ecological plant geography of the province of New Brunswick; 'The Development and Anatomy of Sarracenia,' by Forrest Shreve; 'Physiologically Balanced Solutions for Plants,' by W. J. V. Osterhout; 'The Appressoria of the Anthracnoses,' by Heinrich Hasselbring; '*Nereocystis Luetkeana*,' by Theodore C. Frye, being a biological study of this giant kelp; 'New Species of Castilleja and Senecio,' by J. M. Greenman. The September number contains the following papers: 'Differentiation of Sex in Thallus Gametophytes and Sporophytes,' by A. F. Blakeslee, being a general discussion of sexuality in all the plant groups; 'The Development of the Bouteloua Formation,' by H. L. Shantz, being the second contribution from his study of the mesa region east of Pike's Peak; '*Cortinarius* a Mycorrhiza-producing Fungus,' by C. H. Kaufmann, in which a new species of the genus is described that is connected with three forest symbionts belonging to different families; 'A New Fungus of Economic Importance,' by R. E. Smith and Elizabeth H. Smith, being a new genus (*Pythiacystis*) parasitic on lemons and causing a decay of green fruit trees and in the storehouse.

#### DISCUSSION AND CORRESPONDENCE.

##### DISCONTINUOUS VARIATION AND PEDIGREE CULTURE.

REFERRING to the recent address of Dr. D. T. MacDougal, on 'Discontinuous Variation and Pedigree Culture' (published in *The Popular Science Monthly* for September), the following points may be worth considering:

The species is the unit of the taxonomist, and the study of species and their relations to environment form the basis of the science of distribution.

The species, as thus considered, is a kind of animal or plant as it has developed and as it appears in a state of nature. To know a species as it appears is not to know it completely, as all species develop differently under changed conditions or freed from the stress of competition. Under domestication, or under new chemical or physical conditions, all species are plastic, and all may assume forms the same species can never assume in its original habitat.

The field naturalist can not therefore know everything about any species, no matter how many individuals he may examine. Neither can a garden naturalist, for the forms he deals with must be 'reduced to the ranks' before they are comparable to the species occurring in the wild.

It is presumable that those naturalists know most about species as they are, who have given most time and thought to their study. They may not, however, know better than any others how species originate, nor possess the clue to the main causes or significance of their varying forms.

Yet it is fair to say that as the taxonomist of species finds in practically every case a geographical element in the development; as he finds that segregation and selection have apparently been accompaniments of nearly all changes in species, and as by these same agencies all species can be appreciably changed by the will of man, he may not unreasonably suppose that segregation and selection have each taken some part in that life-adaptation which we call organic evolution.

As a zoologist personally acquainted with Dr. de Vries the writer has great reverence for the noble modesty, the patient, intelligent and epoch-making perseverance which have characterized his work. On the other hand, he is obliged to hesitate at the acceptance of the more sweeping parts of his theory, and to question the assumption that the discoveries of de Vries in plant mutation disclose the actual method of species-forming, general or universal, in all branches of life.

As matters are the species that exist in nature must furnish us our conception of species. The species actually covering the earth are